5.0 THE SELECTED PLAN

5.1 Plan Description

Under Alternative 5, the Selected Plan, wetlands would be restored in the HAAF and SLC parcels using dredged material and natural sedimentation. Before dredged material is placed in the area, perimeter levees would be constructed. The bayward levee would be breached after dredged material placement. Although wetlands on both parcels would be restored, the parcels would not be hydrologically connected because of the need to maintain operation of and access to the NSD outfall pipeline. Internal peninsulas designed to reduce wave erosion would be constructed on the HAAF parcel only. On the SLC parcel, additional material would be placed along perimeter levees to offset wave erosion.

5.1.1 Construction and Restoration Timing

Complete restoration of wetlands under the Selected Plan is estimated to take 30 years. Site construction, which is estimated to take 6 years, will be followed by 1 year of consolidation time for dredged material. After consolidation, the bayward levee will be breached. This period includes the following activities:

- 2 years for site preparation,
- 1 year to place 2.1 million cubic yards of dredged material for restoration of seasonal wetlands,
- 3 years to place 8.5 million cubic yards of dredged material for restoration of tidal wetlands,
- 1 year to consolidate material and breach levee.

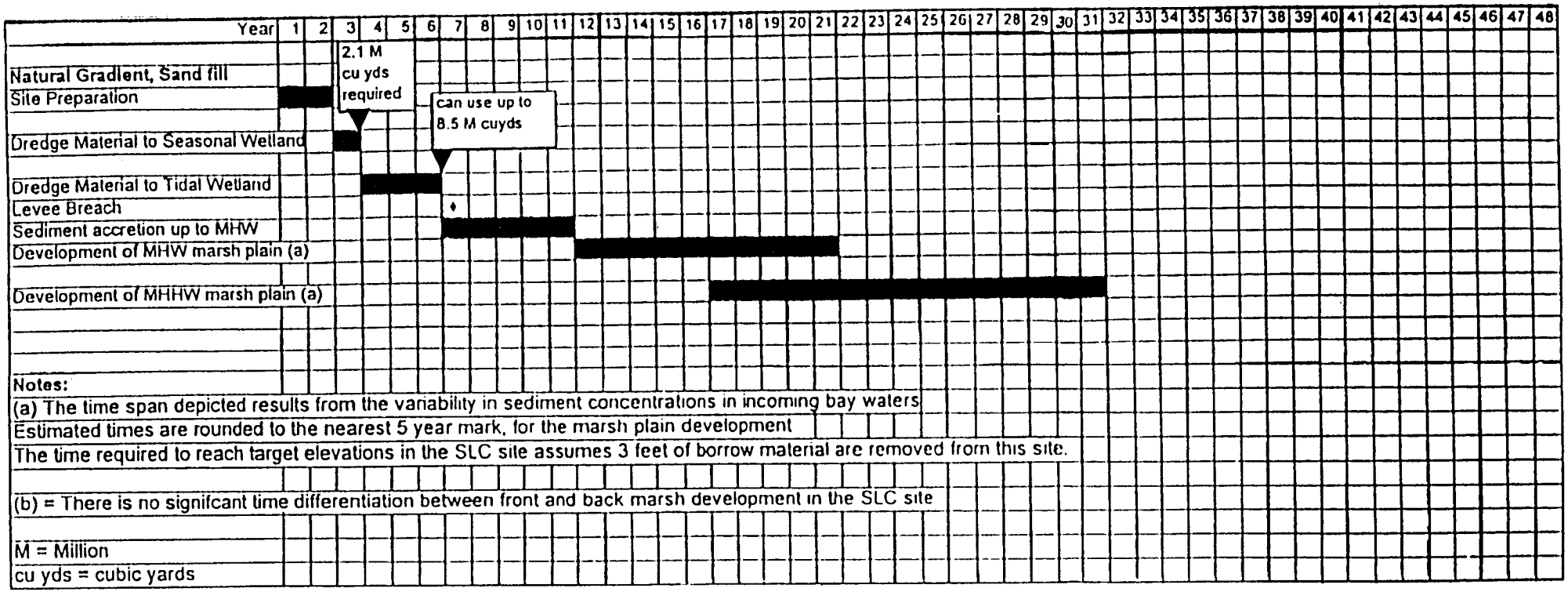
After the bayward levee are breached to allow tidal flow, the proposed restoration of wetlands in the area would be characterized by the following steps, including the estimated time necessary for the restored wetlands to become fully functional:

- natural sediment accretion to mean high water level (year 7 through year 11),
- development of mean high water marsh plain (year 12 through year 21), and
- development of mean higher high water marsh plain (year 17 through year 31).

An important advantage in the use of dredged material is the substantial decrease in the time necessary for restored wetlands to become fully functional. For example, the mean high water marsh plain is expected to be completely developed 6 years sooner under the Selected Plan than under Alternative 4, and the mean higher high water marsh plain is expected to develop 10 years sooner (Figure 5.1).

Feasibility Report Figure 5-1

Figure 5-1 Timeline Comparison, Tidal Wetland Creation



5.1.2 Site Preparation

Site preparation activities under the Selected Plan include: removing remaining buildings and structures; providing temporary drainage; relocating the NSD dechlorination plant; modifying the NSD outfall pipeline; installing and operating the hydraulic off-loader and piping to transport dredged materials to the HAAF and SLC parcels; constructing perimeter levees, berms, and internal peninsulas; placement and consolidation of dredged material; lowering the bayward levee; breaching the bayward levee; and cutting channel through outboard marsh.

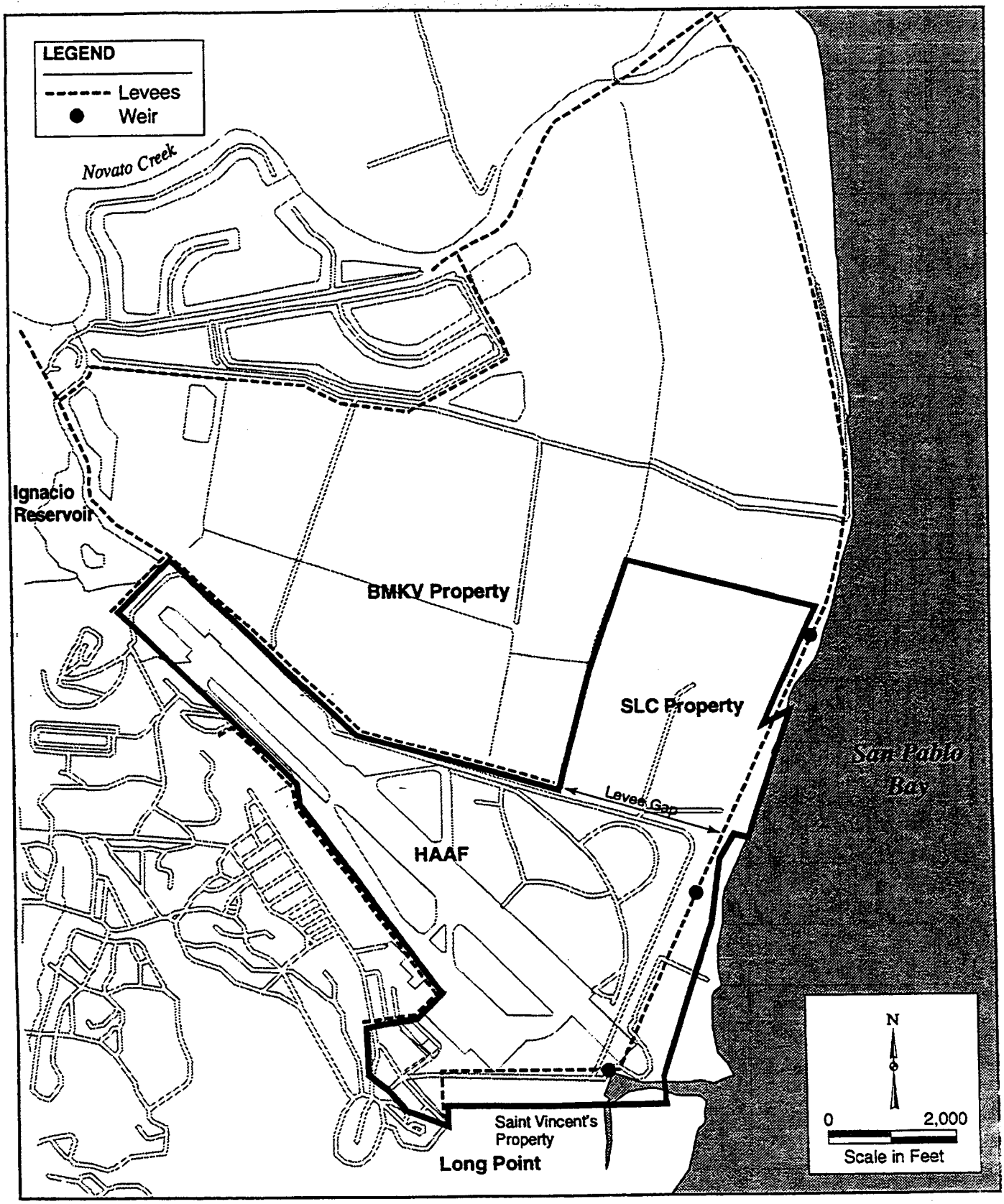
To provide temporary drainage for rainfall and process water resulting from dredged material placement from the HAAF and SLC parcels, drainage weirs would be installed through the outboard levee (Figure 5.1). These weirs would be removed when the bayward levee is lowered.

Approximately 18,200 feet of perimeter levee would be constructed under the Selected Plan (Figure 5.2). Perimeter levees would separate the HAAF parcel from Landfill 26, the BMKV parcel, and the St. Vincent's and Las Gallinas Sanitary District properties. An additional 2,200 feet of levee would be constructed to protect and allow access to the NSD wastewater pipeline. The levee between the New Hamilton Partnership development and the HAAF parcel provides adequate flood protection to the development and would not be modified for flood control purposes. However, fill would be placed on approximately 6,000 feet of the wetland side of the New Hamilton Partnership levee to create a wildlife corridor (Figure 5.2). To achieve a long-term levee crest elevation of +8 feet NGVD, perimeter levees would be constructed to an elevation of +12 feet initially, to accommodate an estimated 4 feet of long-term settlement.

Levee construction techniques would provide adequate stability with regard to the potential for earthquake-induced ground failure. End-of-construction conditions necessary to satisfy the stability factor of safety would be met by constructing levees with side slopes of 3:1 (horizontal to vertical) or flatter, and by constructing toe berms on both sides of the perimeter levees averaging 6 feet high and 50 feet wide. The perimeter levees would have a 200-foot-wide footprint. Over time, as the levee settles and the underlying bay mud consolidates and gains strength, the stability factor of safety would increase to a level well in excess of the required stability criteria.

Internal peninsulas would be constructed within the HAAF parcel only. The primary objective of the peninsulas is to reduce fetch and the potential for erosion of perimeter levees from wave action. The cross-sectional dimensions of the internal peninsulas are shown in Figure 4.2.

Internal peninsulas would not be constructed on the SLC parcel. As an alternative to constructing the internal peninsulas, additional material would be added to the SLC parcel perimeter levees. By design, the additional material would erode and protect the integrity of the levee. Use of the two erosion control methods would allow a comparative assessment of the costs and benefits of each method.



Jones & Stokes Associates, Inc.

Figure 5-2
Temporary Drainage Weirs

Construction of the levees and internal peninsulas could be completed within 18-24 months. A sufficient amount of suitable material is likely to be available from the HAAF and SLC parcels for use in constructing levees and internal peninsulas; however, some material may be brought in from offsite. A specific source for this material has not been identified.

The Novato Sanitary District (NSD) dechlorination plant would be relocated to NSD's Ignacio Treatment Plant, Novato Treatment Plant, or another suitable location outside the project area. Relocating the dechlorination plant would prevent the need to protect the plant from damage due to dredged material placement and tidal action, would alleviate the need to provide an alternative power supply to the plant, and would make the plant more easily accessible to NSD personnel for operational and maintenance purposes compared to leaving the plant in place.

The portion of the outfall pipeline that crosses the SLC parcel would be modified to avoid damage that could be caused by placing fill over the pipeline during construction of the perimeter levee between the SLC and BMKV parcels and the levee between the HAAF and SLC parcels. Depths of new fill placed over the pipeline would be 17 feet where the pipeline crosses under the new levee between the SLC and BMKV parcels and 8-10 feet where the pipeline runs parallel to the new levee between the SLC and HAAF parcels. Damage to the pipeline would be avoided by using site-specific soil treatments to avoid settling and sliplining or by constructing the pipeline with flexible couplings (Figure 5.2).

5.1.3 Placement of Dredged Material

To allow the use of dredged material a hydraulic off-loader would be placed in San Pablo Bay and piping would be installed to connect the off-loader to the HAAF parcel. The off-loader would be powered by electricity and could be in operation as long as 6 years. Although the exact timing of delivery of dredged material to the off-loader is not known, off-loading could occur at any time during the construction period.

The off-loader would be properly marked and lighted, and the pipeline would be submerged and marked, consistent with U.S. Coast Guard regulations, to prevent navigational hazards to watercraft using the area at all times of the day and night. The U.S. Coast Guard would be notified to include an update on project activities in its Information Notice to Mariners.

Dredged material for the wetland restoration project could originate from many sources. One of the most likely sources is the Oakland Harbor navigation improvement project. Other potential sources of material include Bay new work and maintenance projects such as the Concord Naval Weapons Station, Southampton Shoal, Richmond Harbor, Port Sonoma, Bel Marin Keys, and Bahia Lagoon. Evaluating impacts associated with dredging and transporting material to the off-loader is assumed to be the responsibility of the sponsor of each dredging project. An EIR/EIS was recently completed on the

Oakland Harbor navigation improvement project (U.S. Army Corps of Engineers and Port of Oakland 1998a, 1998b, 1998c, and 1998d). That document addressed impacts associated with transporting dredged material to the HAAF parcel and concluded that transporting material on barges would not result in significant impacts on the environment.

The off-loading of dredged material would involve mixing the material with water to allow pumping. After the dredged material slurry is placed, the water would separate from the material and would eventually be discharged to San Pablo Bay. Certain options have been proposed that would ensure that the process water does not violate water quality standards when discharged to the bay. The most viable option is to hold the water in a confined basin within the restoration site for subsequent discharge.

Water quality standards will be specified in the waste discharge requirement stipulated by the RWQCB. The discharge standards for the process water will meet RWQCB standards before water is discharged to the bay.

5.1.4 Lowering and Breaching the Bayward Levees

When it is breached, most of the bayward levee on the HAAF and SLC parcels would be lowered to an elevation similar to the elevation of the marsh plain adjacent to the levee. Portions of the levees would remain at higher elevations to provide high tide refuge. Approximately 3,900 feet of levee on the HAAF parcel and 3,350 feet of levee on the SLC parcel would be modified.

After site preparation activities are completed, the levees separating the HAAF and SLC parcels from San Pablo Bay would be breached and pilot channels excavated (Figure 5.2). The levee breach on the HAAF parcel would be approximately 280 feet wide and 200 feet long; the pilot channel approximately 165 feet wide and 800 feet long. The levee breach on the SLC parcel would be approximately 220 feet wide and 50 feet long; the pilot channel approximately 100 feet wide and 200 feet long. The combined amount of material removed to breach the levees and excavate the pilot channels would be approximately 61,800 cubic yards. Excavated material would be deposited on the HAAF and SLC parcels (Figure 4.1).

The surface area disturbed by the levee breaches and pilot channels would total 5.4 acres. Excavating the levee breaches and pilot channels would affect 1.8 acres of grassland and 3.6 acres of coastal salt marsh.

Track-mounted excavators would be used to excavate the levee breaches. A 6- to 10-inch suction dredge mounted on a small barge would be used to excavate the pilot channels. Material excavated by the dredge would be pumped directly to the HAAF and SLC parcels. This method would limit the amount of coastal salt marsh disturbed during the dredging process. Regardless of the availability of dredged material, levee breaches would be completed no later than 8 years after site preparation begins, to ensure that marsh establishment is not delayed.

5.1.5 Evolution of Site

The appearance of the site will evolve over time (see Figures 5.3-5.7). Initially, the tidal section of the site will consist of subtidal and intertidal mudflat habitats. The incoming San Pablo Bay waters will introduce invertebrates that will rapidly colonize the intertidal mudflats, providing a food source for shorebirds and waterfowl. Bay waters will also introduce a variety of fish to the site such as chinook salmon, striped bass, green sturgeon, steelhead trout, staghorn sculpin, inland silversides, and Pacific herring. The tidal pannes will be present at the time of the breach as a result of site construction. These areas will provide high tide refugia for shorebirds and gulls. It will take at least one full season to accumulate the salt deposits typical of the pannes and for the growth of vegetation around the fringe of the pannes.

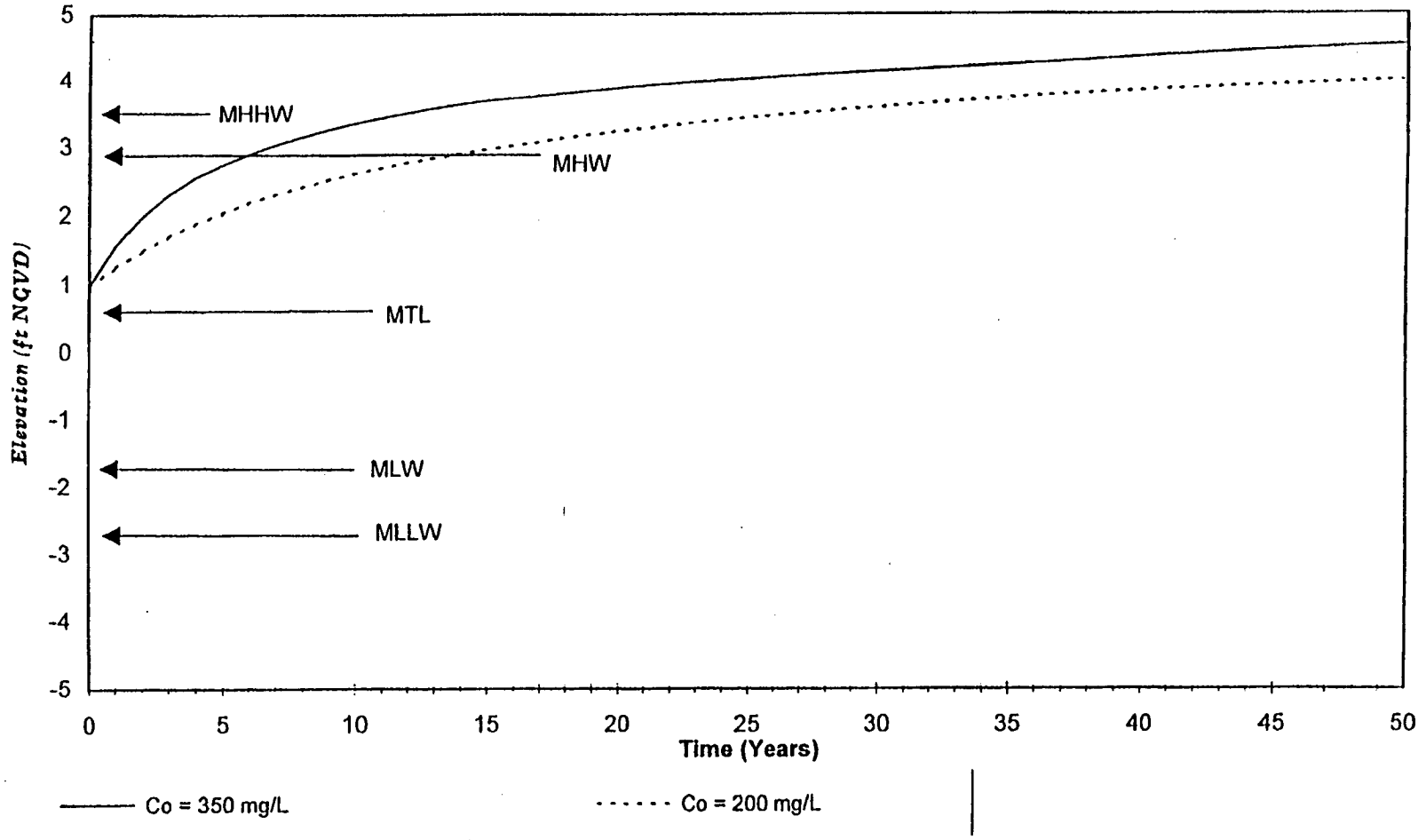
As sediment builds, cordgrass will begin to colonize the site, followed by species such as pickleweed, jaumea, alkali heath, gumplant, and salt grass. The growth of vegetation will be accompanied by the development of the slough channel network. Channels will be broad and undefined at the time of the breach, developing more complexity as the marsh plain elevation increases. Tidal ponds, which were a feature of the historic landscape, are expected to form in the mature marsh.

Tidal pannes are the transitional habitats between areas that receive daily tidal action and non-tidal habitats; seasonal wetland, grassland, and upland. Seasonal wetlands will shallowly pond precipitation, and will have a mixture of areas that have minimal, low-growing vegetation and a drainage channel supporting taller, emergent vegetation such as cattail, bulrush, and some willows along the edge. Many of the bird species present in the tidal wetlands will also use the seasonal wetlands. Seasonal wetland invertebrate communities typically include zooplankton, aquatic beetles, bugs, and flies. Fish are not typically found in seasonal wetlands due to their seasonality and shallow depths. As the annual and perennial grassland and upland habitats mature, shrubs will voluntarily colonize the area.

The distribution of habitat in this alternative is approximately as follows:

Subtidal channel/openwater	= 44 acres
Intertidal channel/mudflat	= 22 acres
Coastal Salt Marsh	= 690 acres
Tidal Pannes	= 41 acres
Tidal Ponds	= 4 acres
Nontidal wetlands	
Seasonal wetland/ponds	= 62 acres
Perennial emergent marsh	= 2 acres
Grassland	= 85 acres
Total*	= 950 acres

*Acreage figures were developed by FWS in preparing the HEP and are not based on real estate acreages calculated by the Corps.



Estimation Parameters:

Co=350 mg/l or 200 mg/l (Suspended Sediment Concentration of Bay Waters)
Cd=350 kg/m3 (Dry Density of Inorganic Material)
Rise=0.21 m/100 yr (Rate of Sea Level Rise)
Assumes average ground surface elevations of -5 and 1 feet NGVD
Mean Monthly Tide From Petaluma River, Entrance (NOS 941 5252)

Hamilton Wetlands:
Sedimentation Curves for the Natural Gradient Alternative

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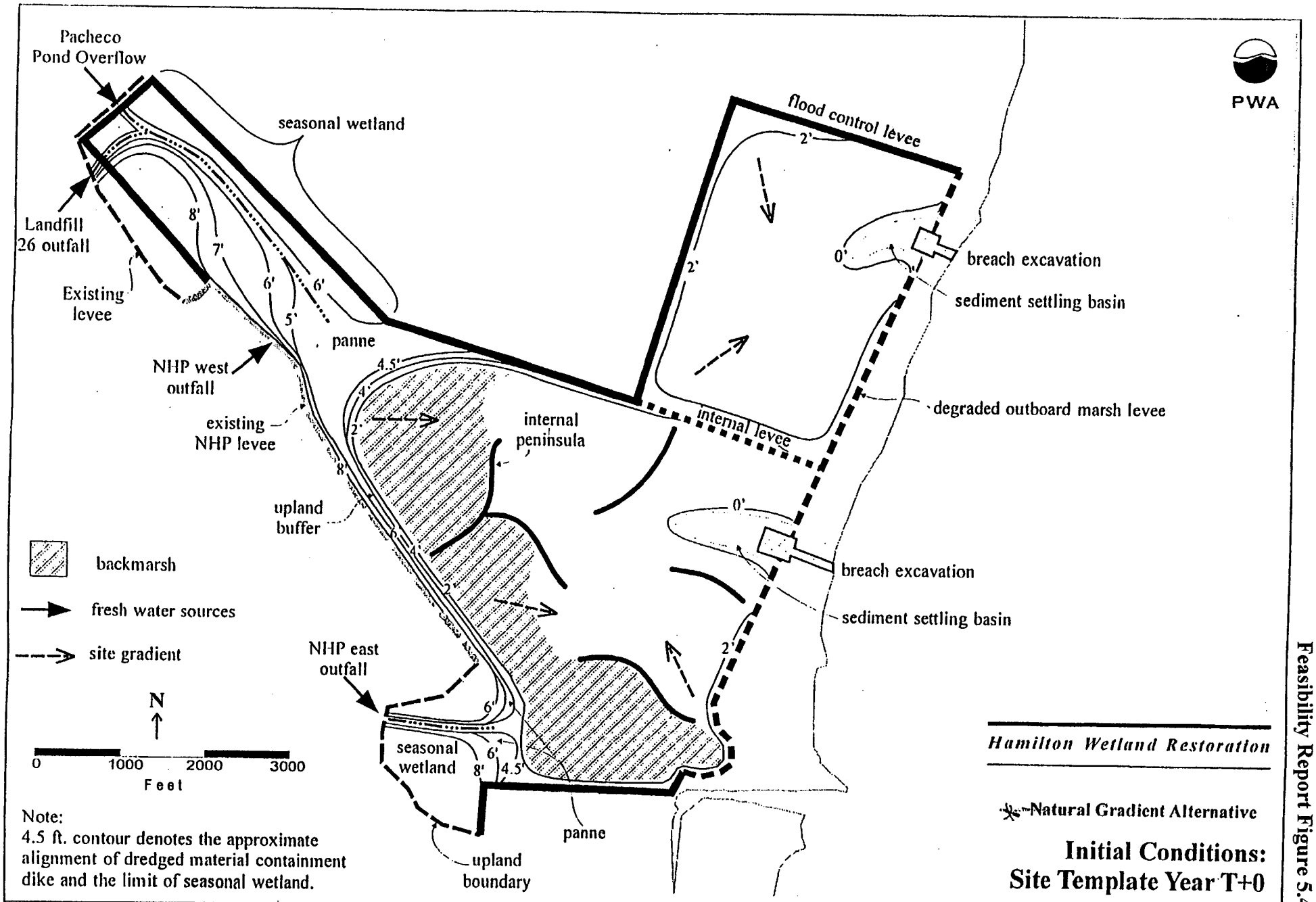
Philip Williams & Associates, Ltd.

Feasibility Report Figure 5.3



Feasibility Report Figure 5.4

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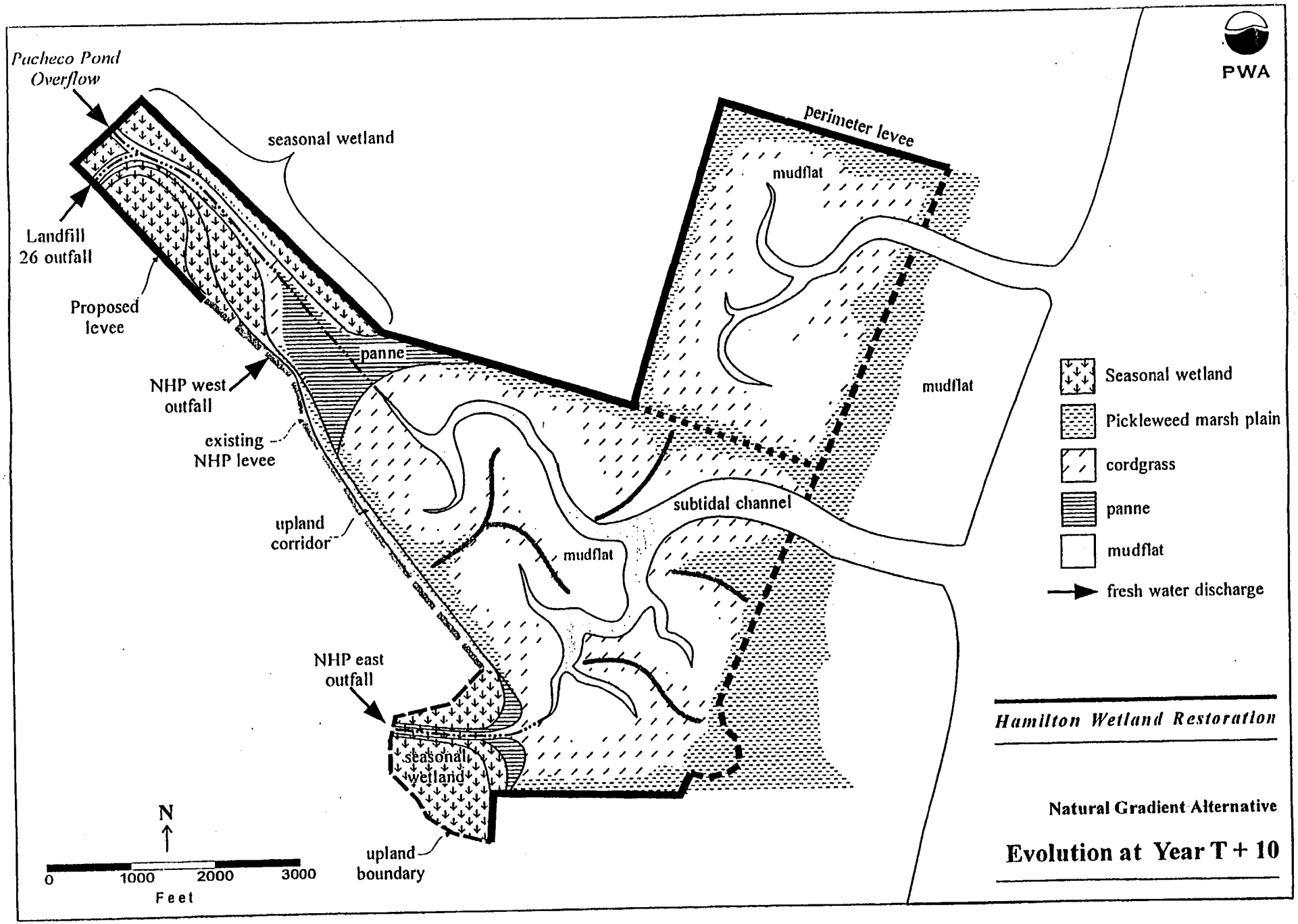

Feasibility Report Figure 5.5

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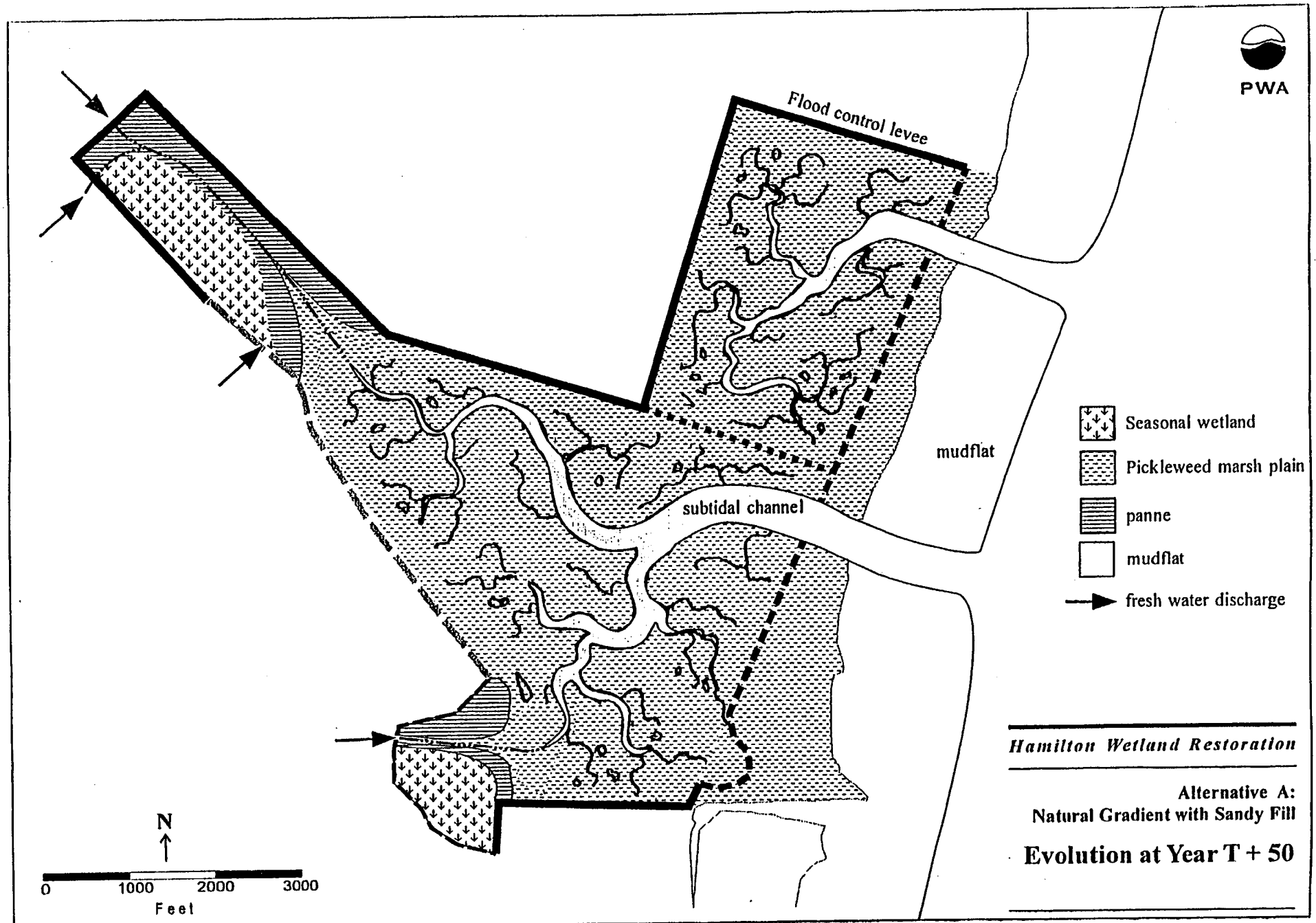

Feasibility Report Figure 5.6

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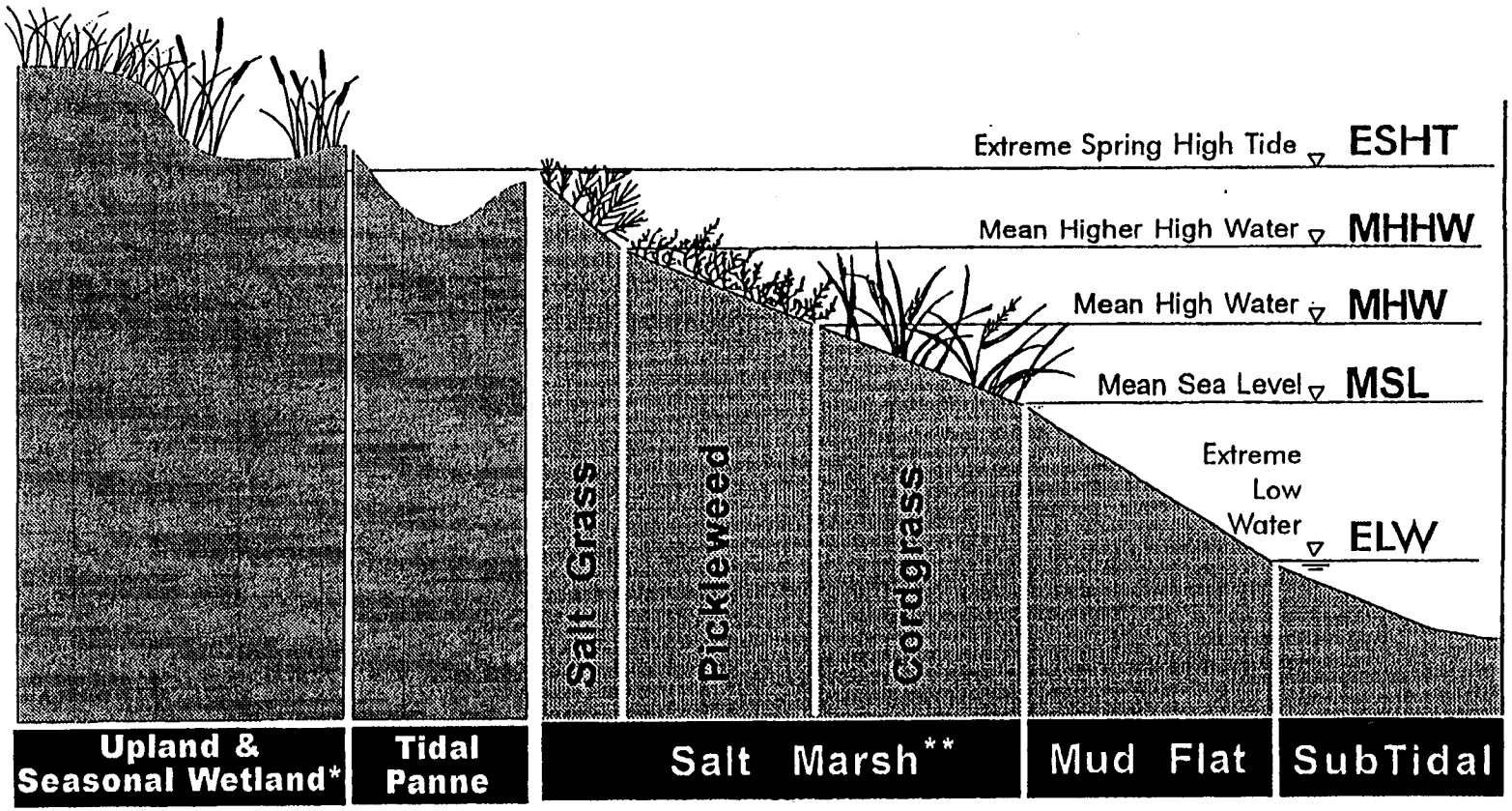

* Upland, seasonal wetland, and non-tidal wetland may be lower than shown if levees artificially prevent tidal inundation.

** Marsh ponds appear on mature marsh plains at local high points in the marsh.

Note: Tidal terms are defined in Appendix B.

Schematic of Habitats by Tide Levels

Feasibility Report Figure 5.7

HamMplants.cdr

PWA

5.2 Summary of Benefits

Alternative 5 has been chosen as the Selected Plan because it best meets the study purposes and the study goal. Alternative 5 creates the most wildlife habitat value and the most tidal marsh habitat value, and provides the greatest benefits to endangered species. This alternative provides the most dredged material disposal capacity, provides this capacity efficiently, and minimizes the impacts of aquatic disposal of dredged material in the bay and ocean.

The habitat benefits obtained from using dredged material to accelerate tidal marsh restoration are relatively expensive when compared to those obtained when creating tidal marsh using only natural sedimentation. However, using dredged material will substantially decrease the time necessary for the restored wetlands to become fully functional. This will accelerate the habitat benefits due to earlier creation of habitat for endangered species of high public and regulatory concern. These accelerated habitat benefits can be considered a free benefit of using an economically efficient method of upland disposal of dredged material, and are additionally supplemented by the unquantified benefits of avoiding aquatic disposal of this material. For these reasons, Alternative 5 best implements a number of federal, state, regional, and local plans, including the Long Term Management Strategy.

5.3 Environmental Requirements and Commitments

5.3.1 Water Resources Council Environmental Requirements

The following page contains Table 5.1, which shows the Selected Plan compliance with the Water Resources Council environmental requirements. It references the statue concerned, the state of compliance and a description of those areas still being completed.

5.3.2 NEPA Compliance

The project has been assessed through the NEPA and CEQA processes. The environmental impacts of the selected plan and alternatives are assessed in the Environmental Impact Statement/Report (EIS/R).

5.3.3 Clean Water Act

A preliminary 404(b)(1) report has been prepared to assess impacts to wetlands and waters of the US and is included as Appendix D. A 402 discharge permit will be obtained from the San Francisco Bay Regional Water Quality Control Board.

Table 5.1
Selected Plan Compliance with Water Resources Council Environmental Requirements

Statute	Compliance	Description
Archeological and Historic Preservation Act of 1980. 16 USC 469, *et seq.*	Partial	HAAF and Navy parcels complete. SLC parcel being completed.
Clean Air Act of 1972 42 USC 7401, *et seq.*	Full	
Clean Water Act of 1972 33 USC 1251, *et seq.*	Partial	A preliminary 404b1 report has been prepared.
Coastal Zone Management Act of 1972 16 USC 1451, *et seq.*	Partial	Once design is complete, A Consistency Determination will be prepared. BCDC has endorsed the project concept.
Endangered Species Act of 1973 16 USC 1531, *et seq.*	Partial	Consultation has begun, a BA has been completed but additional information is required by FWS before continuing with the consultation
Estuary Protection Act of 1963 16 USC 1221, *et seq.*	Full	
Federal Water Project Recreation Act of 1965. 16 USC 460, *et seq.*	N/A	
Fish & Wildlife Coordination Act of 1958 16 USC 661, *et seq.*	Partial	The DCAR has been completed. The FCAR will be finished after design is complete and ESA consultation concluded.
Land and Water Conservation Fund Act of 1965. 16 USC 460, *et seq.*	Full	
National Environmental Policy Act of 1969 42 USC 4321, *et seq.*	Full	The Draft EIS/R has been completed; the Final EIS/R is being circulated with this report.
National Historic Preservation Act of 1966 16 USC 470, *et seq.*	Partial	HAAF and Navy parcels complete. SLC parcel being completed.
Rivers & Harbors Act of 1899 33 USC 403, *et seq.*	Full	
Watershed Protection & Flood Control Act of 1954. 16 USC 1001, *et seq.*	Full	
Wild & Scenic Rivers Act of 1968. 16 USC 1271, *et seq.*	N/A	

5.3.4 Fish & Wildlife Coordination Act

FWS, under contract to the Corps, completed a draft Coordination Act (DCAR) in August 1998, which is included as Appendix E to this report. The DCAR lists several concerns and recommends modification of tidal wetland design, internal peninsula design, and seasonal wetland design.

FWS DCAR recommendations were in two parts: one part proposing to defer the project until monitoring information from Sonoma Baylands is available and the second part listing recommendations if the Corps proceeds without waiting for Sonoma Baylands monitoring data. Corps responses are on the right in the following table:

Table 5-2
FWS DCAR Recommendations, Part1

FWS DCAR #	FWS recommendation	Corps response
1	FWS recommended deferring the disposal of dredged material at Hamilton until design could be based on five years of monitoring data from the nearby Sonoma Baylands project and other related projects.	Monitoring at Sonoma Baylands started in January 1996 and 5 years of data will not be available when this project begins construction. Four years of existing data from Sonoma Baylands and other projects will be used to refine the design.
2	Evaluate Sonoma Baylands monitoring data and similar projects to refine design criteria to maximize success	The Corps will refine the design of this project based upon monitoring data from Sonoma Baylands and similar projects.

FWS provided a series of recommendations for the Corps to implement if the project is pursued prior to obtaining the monitoring data described above. Although the first condition will nearly be met, the Corps is responding to all of the recommendations:

Table 5-3
FWS DCAR Recommendations, Part 2

FWS DCAR #	FWS recommendation	Corps response
1	Avoid impacts to existing wetlands	Will be minimized
2	Minimize impacts to grasslands by reseeding non-tidal areas	Will be done during construction
3	**Minimize contaminant exposure once tidal action is restored by: (a-c)**	
3a	Design "caps" over residual contaminated soils to withstand tidal action	Need will be considered during PED, and in coordination with BRAC.
3b	Conduct random testing of biota, sediment quality, surface water, groudwater, and decant water	A monitoring plan has been developed. Additional requirements will be coordinated through the RWQCB. Only material that meets disposal criteria will be used.
3c	Monitor potential movement of contaminants	Site will be cleaned of contaminants prior to the transfer of property
4	Provide transitional upland area for wildlife	Will be considered during PED
5	**A series of ESA requirements: (a-d)**	
5a	Determine the effects of the project on Threatened and Endangered species or critical habitat	Will be done through the ESA consultation process
5b	Complete a BA	Will revise and resubmit BA
5c	Initiate formal consultation	Consultation has already begun
5d	Implement to protect California clapper rail and salt marsh harvest mouse	This will be done during construction
5di	avoid levee and pipeline construction during breeding season	This will be done during construction
5dii	Exclusion fences and trapping for salt marsh harvest mouse	Will be done during construction
6	Provide a detailed design including target elevations and cover types, channels, breaches. Need to underfill.	This will be reviewed during PED

	Conduct hydrological monitoring	
7	Determine capability of vegetation growing in sandy material	This will be done during PED
8	Develop a final monitoring plan including (a-c)	This will be done during PED
8a	Bioaccumulation	Not necessary
8b	Wildlife activity	This will be done during PED
8c	Changes to outboard wetland habitats	This will be done during PED
9	**Provide to FWS (a-c)**	
9a	Rates of sedimentation following restoration to tidal action	This will be done after construction
9b	Constraints imposed by toxic remediation	This will be done during PED
9c	Flood control considerations	See Section 2.2.1
10	Ensure functioning of 12.4 acre seasonal wetland constructed as mitigation for landfill 26	The seasonal wetland will be replaced
11	Coordinate plans with Bel Marin Keys Unit 5 and other adjacent parcels	On-going
	Investigate: (a-g)	
12a	Tidal flooding at the site	This will be done during PED
12b	Water quality, flushing and circulation from Bay and freshwater sources	This will be done during PED
12c	Existing and target ground elevations	This will be done during PED
12d	Measures to achieve sedimentation and plant establishment	This will be done during PED
12e	Mosquito abatement need	This will be done during PED
12f	Location of cuts in bayward levee	This will be done during PED
12g	Monitoring requirements	A monitoring plan has been developed. Additional requirements will be coordinated through the RWQCB. Only material that meets disposal criteria will be used. A final monitoring plan will be formulated during PED.
13	Develop a public access component	See Section 2.4.5
14	**Consider additional informational needs in Conceptual Restoration Plan (a-d)**	
14a	Time frame for wetlands creation	This will be done during PED
14b	Refine internal peninsula design	This will be done during PED, through coordination with FWS
14c	Observation of similar wetlands on sand or dredged bay substrates	This will be done during PED
14d	Refine tidal panne design	This will be done during PED
15	Use dredged material to create fringing high marsh, then allow natural sedimentation	This was not the selected plan
16	Complete investigations of SLC site so area can be accessed by FWS to complete HEP analysis	FUDS process described in EIS/R. This will be done during PED

5.3.5 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies whose action may affect endangered species to go through a specified consultation process. The Corps, in August 1998, requested from FWS a list of proposed, threatened, and endangered species that may be present at the project site. FWS provided the species list. Then the Corps prepared a Biological Assessment (BA) to analyze the effect of the project on listed species which may be present, in this case, California clapper rail and salt marsh harvest mouse. The BA (Jones & Stokes, August 1998) was submitted to FWS on 24 August 1998. The next step is for FWS to review the BA and then provide a Biological Opinion (BO). This normally happens within 120 days after receipt of the BA, by 31 Dec 98. However this process may be suspended if FWS finds that the BA contains insufficient information. In a letter to the Corps dated 23 September 1998, FWS stated that the formal consultation process would not begin until FWS received the following additional information:

1. A Final Ecological Risk Assessment (ERA), containing cleanup levels protective of listed and proposed species, testing and removal of asphalt, buildings and other structures. The ERA should be available through BRAC in 1999.
2. Details of project design features.
3. Details of public access and trails.
4. Details of the monitoring program.
5. Mitigation and monitoring should be included in the project description.
6. Designation of the ultimate landowner and manager of the property.

The Corps is coordinating with FWS to complete the BO and determine whether the project complies with ESA.

5.3.6 Coastal Zone Management Act

Once design is complete, a Consistency Determination will be prepared. The responsible Coastal Zone Management Act (CZMA) agency, BCDC has endorsed the project concept and has co-managed the project with the SCC.

5.3.7 Cultural Resources Compliance

Full compliance with the National Historic Preservation Act of 1966 and the Archaeological and Historic Preservation Act of 1980 has been achieved for the HAAF and Navy parcels. The requirements of these acts include site surveys and coordination with the State Historic Preservation Officer (SHPO). These surveys and coordination have not been completed yet for the SLC parcel. These requirements will be completed as soon as is practicable to ensure full compliance with these laws. Historic or cultural resources could exist on the SLC parcel, but none are known to exist at present.

5.3.8 Resources of Principal National Significance

Below is a table summarizing the effects of the selected plan on Resources of Principal National Significance.

Table 5.4
Effects on Resources of Principal National Significance

Resource	Source of National Recognition	Description of Effects
Air quality	Clean Air Act	None
Sensitive coastal zone areas	Coastal Zone Management Act	Creates new tidal areas
Endangered & threatened species	Endangered Species Act	Increases habitat
Fish & wildlife	Fish & Wildlife Coordination Act	Increases habitat for wetland species
Floodplains	EO 11988 Floodplain Management	None
Historic and archeological properties	National Historic Preservation Act	None
Prime & unique farmland	CEQ Memorandum August 1, 1980	None in project area
Water quality	Clean Water Act	Temporary increase in turbidity during construction
Wetlands	Clean Water Act	Creates large new wetland area
Wild & Scenic rivers	Wild & Scenic Rivers Act	None in project area

5.3.9 Environmental Commitments

The following environmental commitments are in the selected plan.

a. The Corps has prepared a Clean Water Act Section 404(b) 1 evaluation. In addition, state water quality certification will be obtained after Plans and Specifications (P&S) are completed and before the construction contract is awarded.
b. Dredged material will meet LTMS sediment suitability standards.
c. Threatened and endangered species will be protected during construction, under ESA requirements. The biological opinion will be provided before P&S are completed.
d. The NSD outfall pipeline and NHP drainage facilities will be protected from construction impacts and fill.

5.4 Real Estate Requirements

The sponsor shall provide all lands, easements, rights of way, and relocations (LERRDS) for the construction, operation, and maintenance of the Hamilton Army Airfield Wetland Restoration Project. This is in accordance with the provisions of the terms of Water Resources Development Act of 1986 (WRDA ‘86) and the Project Cooperation Agreement (PCA). The real estate requirements for this project are a total of 988 acres to be acquired for various project features. This includes the airfield parcel consisting of 644 acres to be conveyed in fee to the sponsor through the BRAC process, 319 acres known as the antennae field to be obtained from the State Lands Commission, 18 acres from to be acquired in fee from the U.S. Navy, 6 acres of a levee easement to be acquired

from the City of Novato, and 0.76 acre for pipeline placement to be provided through the Navigation Servitude. The total value of these land rights has been estimated at $241,600.00 including contingencies. (The real estate requirements are described in more detail in the Real Estate Plan, Appendix C, to the Feasibility Report.)

There are no Public Law 91-646 Relocations in this project. There are no utilities being affected by the project that are considered to be relocations as defined in WRDA '86 and the PCA. There is one facility affected by the project, the Novato Sanitation District's Dechlorination Station. This facility is considered to be a facility relocation as defined in WRDA '86 and the PCA.

5.5 Engineering Requirements

The engineering requirements of the selected plan are addressed in Appendix B, the Engineering Appendix. The Engineering Appendix contains hydologic and hydraulic studies, surveying and mapping provisions, geotechnical information, environmental engineering information and project design. Comparative studies, detailed investigation and design are expressed in sufficient detail and determine the recommended plan and its baseline estimate.

5.6 Operation, Maintenance, Repair, Replacement, and Rehabilitation Requirements

A conceptual plan for operations, maintenance, and monitoring of the project after construction has been produced and is included in the Engineering Appendix. This plan is summarized here. The conceptual plan will be greatly expanded and quantified in the detailed design phase of the study.

The plan covers the period after the completion of construction. At the beginning of this period, dredged material will have been placed and the bayward levee breached. Maintenance and monitoring during construction will be described in the plans and specifications for construction. Monitoring of imported dredged material for contaminants will be completed prior to levee breaching.

After the completion of construction, operations and maintenance under the plan will include inspections and surveys of the levees and management of vegetation in upland and non-tidal wetland areas. Vegetation management will focus on creating and maintaining desired vegetation types and discouraging invasive exotic plant species.

Monitoring of biological, hydrological, topographic, bathymetric, and chemical conditions will track the evolution of the site after breaching of the bayward levee. Periodic comparisons of measured conditions with expected conditions will determine whether the development of the site is progressing as planned.

The Corps of Engineers will participate in the monitoring program for 13 years after the end of construction. This period was chosen because it would be approximately the halfway point of the restoration process.

Normally, Corps monitoring of a non-reservoir Corps project ends upon completion of construction. All further operations and maintenance, including monitoring of the project's structural integrity, are then the responsibility of the local sponsor. An exception may be made for monitoring of mitigation plantings, which may extend for five years beyond the end of construction.

This project will be constructed partially through natural sedimentation, created by breaching the bayward levee, over a period of approximately 20 years. This sedimentation process, and associated development of marsh vegetation and appropriate microtopography, including tidal channels, is essential to completion of the project. A reasonable assurance of the success of the project in restoring tidal marsh can not be established until there is substantial evidence that this sedimentation process and associated processes are working as intended. A typical Corps project five-year monitoring period would not be adequate to determine this outcome, as little marsh will have developed by that time. It is expected that a 13-year monitoring period should be adequate to establish the likely success of the project. Seventy-five percent of the new tidal marsh habitat is expected to be established by year 13. Continued monitoring after 13 years under the detailed plan will be the responsibility of the non-federal sponsor.

5.7 Summary of Costs

Table 5.5 presents the summary of costs for the selected plan.

Table 5.5

Hamilton Wetland Restoration Study
Summary of Costs for the Selected Plan
(Oct. 1998 Price Levels)

Lands & Damages	$241,600
Relocations	$2,138,200
Levees and Floodwalls	$20,855,800
Dredged Material Placement	$27,809,100
Adaptive Management Monitoring	$1,530,650
Preconstruction, Engineering & Design (E & D)	$1,210,000
Construction Management (S & A)	$2,900,000
Total First Cost	$55,154,700
Interest During Construction	$7,188,900
Total Investment Cost	$62,343,600
Average Annual Cost (@6 7/8 %)	$ 4,446,300
Other OMRR &R Costs	$ 322,000
Total Annual Cost	$ 4,768,300

* Note: Federal savings from project implementation include $400,000 annually in O & M costs.

5.7.1. Basis of Cost

The Corps of Engineers' Micro Computer Aided Cost Estimating System (MCACES) was used to develop the construction cost of the project. This estimate is based on Woodward-Clyde concept plan, reference *Hamilton Wetlands Conceptual Restoration Plan and Technical Appendices*, prepared by Woodward-Clyde for the State Coastal Conservancy, the City of Novato, April 24, 1998. The estimated costs are based on October 1998 price levels, a 50-year period of analysis and the present Federal Discount Rate of 6 7/8 percent (FY'99).

Project Phasing

PED Phase: The Pre-construction, Engineering, and Design Phase will take approximately 18 to 24 months to complete.

Phase 1: The majority of work for this project is the levee construction which will take approximately 2 years to construct. This involves site preparation for the placement of dredged material. It also includes hydroseeding levees. While the project start date is scheduled to begin FY 2001, this phase could be accelerated through authorization and/or a congressional add.

Phase 2: The placement and grading of dredged material to create wetland would take approximately 4-5 years.

Phase 3: Lowering levee, breaching levee, construction of the outboard marsh channels, and weir structures removal is expected to take a maximum of one year to complete. Monitoring, maintenance, and adaptive management would take place over a 13 year period.

5.7.2 Incremental Costs

The incremental costs are defined as the additional costs of placing the dredged material at the Hamilton site instead of the traditional least-cost disposal sites for Corps navigation projects. It should be noted that the projects identified in this section were considered to be the most viable and most likely to be implemented. Moreover, the inclusion and description of these projects in this Feasibility Study do not exclude the many other projects listed in Tables 2.3 and 2.4 as potential sources of dredged material for the Hamilton Wetlands creation.

Several types of cost estimating procedures were used to evaluate the incremental costs An overview of this investigation is presented below relative to New Work Dredging and Maintenance Dredging.

New Work Dredging - Incremental Cost of Hamilton vs. Ocean Disposal

The June 1998 Draft Feasibility Study used a bare incremental cost for new work material placement at Hamilton of $1.30 per cubic yard and a marked up cost of $1.57 per cubic yard. The basis for this cost was research presented in the Hamilton Wetlands Conceptual Restoration Plan. To support this conservative cost estimate, the incremental costs were evaluated under two scenarios.

Analysis of information contained in the Port of Oakland -50 foot Project EIR/EIS has indicated an incremental cost of approximately $1.25 per cubic yard for wetland placement verses ocean disposal. The costs of placing 2.5 million cubic yards (cy) at Hamilton is approximately $11.18 per cubic yard; for ocean, the cost is $9.94 per cy.

For greater quantities of dredged material, the incremental costs of disposal are lower. According to detailed MCACES cost estimates prepared by the District Cost Estimating Section, the cost to place 5.1 million cubic yards of the Port of Oakland -50 foot Project material to Hamilton is $10.80 per cubic yard. The cost to place this material to the ocean is $9.94. The resulting incremental costs of disposing at Hamilton verses the ocean is $0.86/cy. These project specific costs estimates were also reviewed by an independent consulting engineer who specializes in navigation and wetland restoration projects.

Due to the investigations discussed above and the location of the Hamilton Project relative to the majority of new work dredging projects in San Francisco Bay Area the incremental cost of $1.57 per cubic yard (including markup) is believed to be a conservative and realistic estimate and will continue to be used in the Project MCACES analysis.

Maintenance Dredging - Incremental Cost of Hamilton vs. In-Bay Disposal

The June 1998 Final Feasibility Study used a bare incremental cost for maintenance material placement at Hamilton of $3.00 per cubic yard and a marked up cost of $3.32 per cubic yard. The basis for this cost was also research presented in the Hamilton Wetlands Conceptual Restoration Plan.

The District Cost Estimating Section prepared numerous detailed cost estimates of wetland placement of maintenance dredging material at Hamilton and placement of this same material at the Alcatraz in-Bay site. Analysis of these estimates by Corps staff indicated that the average incremental cost for three medium-sized private projects and three medium to large Corps projects was $3.32 per cubic yard. These projects were believed to be the most viable and were based on the previously identified selection criteria. The tables on the following pages derive the incremental costs for the medium size O & M projects.

Dredged Material Sources - 60% Maintenance and 40% New Work

The decision to assume a 60% - 40% split in the dredged material supplies for the Hamilton Project was based on existing estimates of existing and potential local sources

of dredged material suitable for the Hamilton Project. This split also was based on the assumption that new work material would be somewhat harder to incorporate into the Hamilton Project due to multiple project timing considerations and that local maintenance dredging projects occur on a relatively regular basis.

The New Work Dredging Projects that are currently considered likely for use in the Hamilton Project are presented in Table 5.6 below. These currently active projects could potentially supply all the material required for the Hamilton Project.

Table 5.6
New Work Dredging Projects Being Considered

Project	Material Type Available	Timing Compatibility
Port of Oakland -50 ft.	Sand and Fines	High
Southampton Shoal	Sand and Fines	High
Concord NWS	Sand and Fines	Medium
Port of Redwood City	Primarily Fines	Uncertain

The Hamilton Wetlands Conceptual Restoration Plan identified 17 specific maintenance dredging projects that could supply approximately 2.2 million cubic yards to the Hamilton Project on an average annual basis. This maintenance includes 1.7 million cubic yards of fines and 0.5 million cubic yards of sand. This volume of material is adequate to fully construct the project in 5 years with no new work material.

Review of an analysis by District staff conducted for the LTMS indicated three medium sized Corps maintenance dredging projects (Port of Richmond, Port of Oakland and Port of Redwood City) could provide an annual average of 1.3 million cubic yards of material. This analysis also indicated that three medium sized non-Corps maintenance dredging project (Chevron, Port of Oakland Berths and NAS Alameda) may also be able to provide dredged material.

O&M Dredging Volumes
O&M dredging volumes, and unit prices are from COE report *LTMS In-Bay/Alternative Disposal Costs* 1/9/98. Material characteristics and dredging frequencies are from Moffatt & Nichol's report *Inventory of San Francisco Bay Area Dredging Projects, Dredge Material Reuse Study* 5/97.

The O&M dredging projects and volumes were based on the following factors:
- project vicinity
- dredging frequency
- material suitability for wetlands development
- economies of scale, i.e., Medium size projects were selected to take advantage of economies of scale to absorb the fixed costs (e.g., mobilization and demobilization, pipeline, off-loader and dredge plant equipment).

The unit prices developed for each O&M project selected were based on complete MCACES estimates developed by the COE for disposal at Alcatraz (SF-11) and the Hamilton Wetlands site. Unit prices for disposal to the Hamilton site are complete costs which include: mobilization & demobilization of the dredge plant, pipeline, off-loader; dredging; hauling; pump out; monitoring; and distribution of dredged material. Unit prices for disposal to Alcatraz (SF-11) are complete costs which include mobilization & demobilization of the dredge plant; dredging; hauling; dumping; and monitoring.

The dredging costs used in this analysis are "stand alone" costs, which means that for each potential O&M dredging project disposing at Hamilton, the projects are independent of each other. The costs for each project includes its own pipeline, off-loader, dredge plant. All costs for mobilization of the dredge plant to the project site, demobilization of the dredge plant after project completion, installation of the pipeline and off-loader, and removal of the pipeline and the off-loader once the project is completed is included in the unit price. These costs assume that there is no sharing of dredge plant, pipeline, and off-loader between the O&M projects. Fixed costs may be reduced substantially if there is sharing of equipment between the dredging contractors through cooperative agreements.

New Work Dredging Volumes

New work dredging volumes, unit prices, and material characteristics are from the Oakland –50' MCACES prepared by COE, and Woodward-Clyde's report *Hamilton Wetlands Conceptual Restoration Plan, Technical Appendices* 4/24/98.

The new work dredging projects and volumes were based on the following factors:

- project vicinity
- dredging frequency
- material suitability for wetlands development
- economies of scale, i.e., Medium size projects were selected to take advantage of economies of scale to absorb the fixed costs (e.g., mobilization and demobilization, pipeline, off-loader and dredge plant equipment).

The unit prices for Oakland new work were based on complete MCACES estimates developed by the Corps for the Oakland –50' project for disposal at SF-DODS and the Hamilton Wetlands site. Unit prices for the Southampton Shoal and Concord Naval Weapons Station projects are from estimates using comparative analysis and historical data developed by Eric Polson, P.E., Consultant, as part of the Woodward-Clyde report referenced.

Unit prices for disposal to the Hamilton site are complete costs which include: mobilization & demobilization of the dredge plant, pipeline, off-loader; dredging; hauling; pump out; monitoring; and distribution of dredged material. Unit prices for disposal to SF-DODS are complete costs which include mobilization & demobilization of the dredge plant; dredging; hauling; dumping; and monitoring.

The dredging costs used in this analysis are "stand alone" costs, which means that for each potential new work dredging project disposing at Hamilton, the projects are

independent of each other. The costs for each project includes its own pipeline, off-loader, dredge plant. All costs for mobilization of the dredge plant to the project site, demobilization of the dredge plant after project completion, installation of the pipeline and off-loader, and removal of the pipeline and the off-loader once the project is completed, is included in the unit price. These costs assume that there is no sharing of dredge plant, pipeline, and off-loader between the new work projects. Fixed costs may be reduced substantially if there is sharing of equipment between the dredging contractors through cooperative agreements. The following tables, 5.7 and 5.8, summarize the types of dredged material, along with the sources and the incremental costs.

Table 5.7
Dredging Material Types, Sources and Incremental Costs
O & M Projects, (Medium-Size Projects)

	Material Type	Dredging Frequency	Avg. Annual Quantity cu. Yd.	Incremental Cost equals Hamilton Disposal Cost Minus In-Bay Disposal Cost	Total Incremental Cost (Bare) $ per 1000
O&M Projects - Private					
Chevron	Silt / Sandy Silt	2 years	150	2.86	429
Port of Oakland	75% Silt / Clay	Yearly	155	2.83	438
NAS Alameda	silt / clay / sand	2-3 years	149	2.67	398
O&M Projects - COE					
Port of Richmond	Inner clay, Outer Loam 75% Silt / Clay	Yearly	383	2.25	864
Port of Oakland	Silty Clay 75% Silt / Clay	Yearly	145	2.90	420
Redwood Harbor	75% Silt / Clay	2-3 years	288	1.65	475
Annual Total			**1,270**		**3,024**
Incremental O & M Total (5 year duration)			**6,350**		**15,119**
Total Yards/Total Incremental Cost = Incremental Cost/cy					**$2.38**
O & M Incremental Cost = Incremental Cost/cy x Hamilton Mark-up					**$3.32**

Table 5.8
Dredging Material Types, Sources and Incremental Costs
New Works Projects, Corps of Engineers

	Material Type	Dredging Frequency	Avg. Annual Quantity (cy)	Incremental Cost equals Hamilton Disposal Cost minus SF-DODS Disposal Cost	Total Incremental Cost w/markup $ per 1000
Port of Oakland 50' Project	Sands and Fines	Yearly	500	$1.24	620
Southampton Shoal	Sands and Fines	Yearly	175	$1.31	229
Concord Naval Weapons Station	Sands and Fines	Yearly	175	$1.31	229
Annual Total			**850**		**1,079**
Incremental New Works Total (6 year duration)			**4,250**		**5,393**
Total Yards / Total Incremental Cost = Incremental Cost /cy					
New Work Incremental Cost				**$1.27**	

5.7.3 Interest During Construction

The Corps has accounted for the opportunity cost of capital used during the construction phase of project implementation. The calculation of Interest During Construction (IDC) is used to determine the total investment costs of a project. The IDC costs are added to the actual project costs to account for the total project cost. Project costs include: construction, lands, easements, rights-of-way; relocations and damages, utility relocations; mitigation, engineering and design, supervision and administration; and contingencies. The IDC was calculated using the present Federal Discount Rate of 6 7/8 percent (FY '99) was compounded quarterly, and only applied to construction phases of the project. Monitoring costs, which are expected to be incurred after construction, were not included in the IDC calculations.

Separate IDC costs were determined for each construction phase for each project alternative. Alternatives 2 and 4 both entail two phases with completion of project construction within two years. Alternatives 3 and 5 are comprised of four phases with an expected completion within six years.

Table 5.9

Interest During Construction					
Alternative 5					
Construction Period	PED Phase	Years 0-2 Site Preparation	Years 2-7 Dredged Material Placement	Year 7 (Quarters 1-2) Breach Levee	Years 0-7 Monitoring During Construction
Expenditures	$1,210,000	$16,911,675	$29,036,338	$911,068	$2,900,000
# of Quarters	8	8	20	2	28
Expenditures/ Qtr	$151,250	$2,113,959	$1,451,817	$455,534	$103,571
USCAF*	8.498	8.498	23.629	2.017	35.578
Total Investment Cost	$1,285,322	$17,964,424	$34,304,119	$918,812	$3,684,849
IDC	$75,323	$1,053,078	$5,267,781	$7,744	$784,849

*Uniform Series Compound Amount Factor (describes the magnitude of growth of $1 deposited periodically)

5.7.4. Cost Apportionment and Allocation

All costs associated with the alternatives are allocated to environmental restoration. The sponsor is then responsible for all Lands, Easements, Rights of Way, Relocations and Disposal areas (LERRDS) and any cash contributions that may be required to bring the local share up to 25% of the total project cost. The following table presents the federal and non-federal share of project costs and the breakdown by project phase.

Table 5.10
Hamilton Wetland Restoration Study Cost Apportionment

Cost Category	**Initial Federal Contribution**	**Initial Non-Federal Contribution**	**Total Contribution**
Lands and Damages	$ 39,100	$ 202,500	$ 241,600
Relocations	$ -	$ 2,138,187	$ 2,138,187
Levees and Floodwalls	$ 20,855,825		$ 20,855,825
Navigation Ports & Harbors	$ 27,809,100		$ 27,809,100
Planning Engineering & Design	$ 1,210,000		$ 1,210,000
Construction Management	$ 2,900,000		$ 2,900,000
Sub-Total	$ 52,814,025	$ 2,340,687	$ 55,154,712
Adjustment	*$ (11,447,991)*	*$ 11,447,991*	
Total First Cost Share	**$ 41,366,034**	**$ 13,788,678**	
Percent of First Cost	75%	25%	

5.8 Risk and Uncertainty

5.8.1 Uncertainty in Projections

Rate of Sedimentation
The timeframe for the evolution of wetland habitats on the site depends on the rate of natural sedimentation after breaching and reintroduction of tidal action. The actual rate of sedimentation that will be observed on the site is uncertain for several reasons. First, the volume of suspended sediments in San Pablo Bay waters exhibits large spatial and temporal variability. A long-term integrated data set of sediment rates is not available for this location. Project design relied on observed sedimentation rates from other shoreline locations and episodic sampling of suspended sediment loads in San Pablo Bay. Therefore, the actual volume of suspended sediments in the tidal prism entering Hamilton will not be known with certainty prior to breaching the site.

Secondly, the pattern of *net* sediment deposition on the site will depend on the interaction of sediment deposition and resuspension that depends, in turn, on tidal currents, wind and wave action, site design and the pattern of colonization by vegetation. These dynamics would be very difficult to model accurately for such a large site, even if the volume of sediments entering the site were known with certainty. Therefore, conservative estimates were used for deposition in the site using hydrodynamic modeling and derived sedimentation curves. A basic assumption was made that sediment deposition rates would be higher at the front of the site near the sediment-rich tidal inlets, and lower in the back areas of the restored tidal marsh.

Sources of Material
There are a wide range of potential dredging projects that could be used to construct site features at Hamilton. In order to estimate the likely volume of material that could be used to construct the site, an analysis was made of the likelihood of the availability of dredging project.

New Work. New work projects are desirable because they can provide large volumes of material rapidly and have better economies of scale and funding. The new work projects proposed in the region were evaluated for their feasibility and costs. Deepening projects at the Port of Oakland, Pinole Shoal, and Redwood City were selected because they have a strong feasibility of implementation during the construction of Hamilton and because they appear to be cost-effective for use at Hamilton.

Maintenance Dredging. Although maintenance dredging volumes are lower per episode than new work projects, they are dredged on a more predictable basis than deepening projects. The feasibility analysis used the larger Corps and private maintenance projects in Central Bay and San Pablo Bays. This analysis showed there is an adequate volume of material to construct the site. However, even if some of these projects are not subsequently available there are other maintenance projects that could be used instead. The plan proposes that all feasible Bay dredging projects with suitable material during the construction period will be used for Hamilton construction.

Based on this analysis, there is an adequate volume of dredged material that can feasibly be used to construct Hamilton site features. For the reasons stated above, the use of new work projects is likely more desirable. However, a conservative estimate of the use of 60% use of maintenance material and 40% new work material was used in the cost estimates. This was based both on the analysis of the availability of potential projects discussed above and the fact that the timing of maintenance projects is more predictable than for new work projects.

5.8.2 Value Engineering Initiatives

Project Expansion Adjacent to Landfill 26

The perimeter levees are a major cost component of site preparation at Hamilton. If the project area was expanded to include a 14-acre area adjacent to Landfill 26, the perimeter levees could tie into high ground rather than being extended in order to tie into the existing New Hamilton Partners levee, as is proposed in the base plan. This change would reduce the length of levee needed by 2,000 feet as well as reduce the associated cost and maintenance requirements. It would also eliminate the need to drain storm-water from this area, which otherwise would need to be added to Landfill 26 drainage and pumped over the perimeter levees into the restoration site. Addition of this area would also increase the capacity of dredged material that could be reused on the site by 300,000cys. The property is part of the GSA Phase II parcel that is proposed to be turned over to the City of Novato. Both the City and the Army have agreed, in concept, to including the parcel as part of the real property transferred to the Coastal Conservancy as a public benefit discount conveyance for inclusion in the restoration project. Including this parcel in the restoration project would be predicated on a determination that the expansion would reduce project costs and complexity, and that inclusion of the property would not have adverse impacts on the project or on closure of Landfill 26. This evaluation and determination is proposed to be made during PED.

Project Expansion to Include California Quartet (Bel Marin Keys V)

A substantial increase in project benefits could be achieved through expanding the project site to include the adjoining 1,610-acre California Quartet (Bel Marin Keys V) (BMKV) property; expanding the total project site to approximately 2,500 acres. The actual habitat benefits accrued would undoubtedly be greater even than the large proportionate increase in the project size, because larger contiguous habitats are more robust and productive than smaller more fragmented habitats. For example, the larger resident populations of endangered species, such as the California clapper rail, will be able to exhibit more genetic diversity and have a greater area of refuge if habitat temporarily becomes degraded or eliminated on a portion of the site. Also, potential adverse impacts to resident species from activities outside the project site, such as predation by cats and dogs from adjacent developed areas, would be buffered by the increased size of the site.

A significant unit-cost savings may also accrue from expansion of the project to include BMKV. Perimeter levees of the current design fronting on the BMKV property would then not need to be constructed. Levees already exist along the perimeter of the BMKV property not fronting on the project site. These levees would need to be bolstered where

they protect existing developed or farmed areas. However, the length of these levees is less than that of the levees that would not be needed, and the cost of bolstering the smaller length of existing levees would likely be significantly lower than constructing the new levee proposed in the current plan.

Unit-costs would also likely decrease due to the economies of scale for a larger site, for example by dividing equipment mobilization costs over a larger project.

Finally, because the BMKV site is subsided to roughly the same extent as the project area, the greatly increased acreage would provide a greater and longer-term benefit to implementing the LTMS program than the current project. This would result through the increase in the capacity for beneficial reuse of dredged material from Bay projects and because the unit cost of bringing material to the site would likely be decreased through the economies of scale discussed above.

The State of California will be preparing conceptual plans and environmental review for the inclusion of the BMKV property into the project. This information will be provided to Congress when completed.

Cooperative Use of Dredged Material Off-loader and Pipeline

Several conservative assumptions made in this Projects MCASES Cost Estimate will likely yield significant cost savings during future Value Engineering Studies. The expected areas of significant savings include reduction of mobilization and demobilization costs for the dredged material off-loader and pipeline by projects sharing a single off-loader and construction of the intertidal berm on portions of the project flood control levees with hydraulically placed dredged material instead of standard land based construction with on-site borrow material.

The current project MCASES cost estimate assumes that six maintenance dredging projects and three new work dredging projects will contribute dredged material to completely construct the Project. The MCASES also assumed that each project is “stand alone” and will mobilize and demobilize the dredged material off-loader and pipeline. The maintenance dredging projects could include up to 22 separate mobilization sequences and the new work projects would likely contribute at least 3 mobilization sequences. The cost of these 25 mobilization sequences could be approximately $8.2 million. If all projects contributing dredged material to the site shared a single off-loader and pipeline mobilization sequence with an allowance for limited standby time between projects the cost could be approximately $1.1 million. This yields a potential project cost savings of up to $7.1 million.

Additionally, the reduction in mobilization sequences would have an environmental benefit by substantially reducing the disturbance to the existing outboard marsh and mud flats from repeated placement and removal of the dredged material discharge pipeline and reduced air quality impacts from tug movement of the off-loaders, pipelines and related equipment.

Alternative Construction Method for the Intertidal Berms
The intertidal berms are proposed to protect 12400 feet of Project flood control levee from wind wave erosion. The construction of these berms requires the placement of approximately 260,000 cubic yards of material. The MCASES estimated cost of constructing these berms with on-site borrow material and standard heavy equipment techniques is approximately $1 .9 million. If these berms were constructed with hydraulically placed dredged material the MCASES cost could be approximately $0.8 million. This yields a potential project cost savings of approximately $1.1 million.

Construction Phasing
The construction of the project could include site preparation concurrent with dredge material disposal, and that would allow for multiple sources of dredged material to access the project area. This would be accomplished by creating independent cells that would allow for different types of dredged material at different locations in the site. Through concurrent site preparation and construction, the schedule could be expedited, resulting in savings in labor and equipment costs as well as generating valuable habitat earlier.

Monitoring Evaluation
The lengthy period of time required for the marsh plain to be developed necessitates a long term monitoring program. A typical five year monitoring period is unlikely to be sufficient in measuring the ultimate success of the restoration project. To reduce monitoring costs, periodic evaluations could be conducted to assess monitoring needs. Monitoring efforts could be reduced or eliminated as success criteria are met. In addition, more efficient methods of monitoring could be incorporated as familiarity with the site develops. Monitoring and evaluation would be developed further in PED as design elements are more clearly defined.

5.9 Project Implementation

5.9.1 Construction Funding

The schedule for project implementation assumes authorization in WRDA 2000. After project authorization, the project would be eligible for construction funding in FY 2001. The project would be considered for inclusion in the President's budget based on national priorities, magnitude of the Federal commitment, economic and environmental feasibility level of local support, willingness of the non-Federal sponsor to fund its share of the project cost and budgetary constraints that may exist at the time of funding. Once Congress appropriates Federal construction funds, the Corps and the non-Federal sponsor would enter into a project cooperation agreement (PCA). This PCA would define the Federal and non-Federal responsibilities for implementing, operating, and maintaining the project, and is scheduled for execution in FY 2000.

Table 5.11
Project Schedule

Project Phase	Start Date	Finish Date
PED	**April 1999**	**September 2000**
Phase One (Site Preparation)	**October 2000**	**October 2002**
Phase Two (Dredged Material Placement)	**November 2002**	**October 2006**
Phase Three (Breach Levee, Monitoring)	**November 2007**	**November 2020**

5.9.2 Funding Requirements by Phase

The following table shows the funding requirements for both the Federal and non-Federal sponsor by Phase.

Table 5.12
Funding by Phase

75% Federal 25% Non-Federal	PED Costs	Phase 1- Site Preparation (Yrs 0-2)	Phase 2--Dredged Material Placement (Yrs 2-6)	Phase 3- Monitoring (Yrs 7-20)
Federal	$907,500	$14,202,106	$25,573,127	$683,301
Non-Federal	$302,500	$4,734,035	$8,524,376	$227,767
Total	$1,210,000	$18,936,141	$34,097,503	$911,068

5.9.3 Financial Capability of the Sponsor

The objective of this analysis is to conduct an initial financial assessment of the non-federal sponsor for the Hamilton Army Airfield Wetland Restoration Project. This initial assessment is intended to demonstrate that the cost sharing partner, the California State Coastal Conservancy (SCC), has successfully met its financial commitments in the past, has a variety of funding sources available to it, and has the capacity to ensure that the non-federal portion of the project funds will be available.

The First Cost estimate for the Selected Plan is estimated to be approximately $56 million dollars. The non-federal share of the projects first cost is approximately $14 million dollars.

Prior Corps Cooperation
The Conservancy has successfully cooperated with the Corps of Engineers on several previous occasions. Both Sonoma Baylands and the Napa Salt Marsh projects were sponsored by the Conservancy. The financial obligation of the sponsor with regard to both of these projects has been met in a timely and comprehensive manner. They have also met all of their financial obligations with regard to cost sharing the present feasibility study. The successful participation and financial performance of the local sponsor in

these and other non-corps projects indicates the Conservancy's good faith effort to meet its financial obligations.

Funding Sources
The Conservancy's operation and programs are funded through a variety of sources. Its fiscal year (July 1, 1998-June 30,1999) budget is approximately $40 million dollars. The budget is financed primarily through the State of California's General Fund. In addition supplemental funding for specific projects can be obtained form a variety of alternative sources. In any given year, these funding sources can include the following revenue generating vehicles:

1. Habitat Conservation Fund: The Conservancy is legislatively mandated to receive funds accruing to the Habitat Conservation Fund.

2. CALFED: A state and federal program to fund water resource and environmental conservation projects. The conservancy receives funds from CALFED for restoration projects, including $1 million for Hamilton.

3. Private Foundations and Individual Donations: The conservancy applies for and receives grants from a variety of entities. Some of the recent foundations committing funds to the Conservancy are the Marin Community Foundation (MCF) and the Hewlett foundation.

4. State Grants: The Conservancy can receive and disburse funds from other state grant programs for coastal resource projects.

5. General Obligation Bonds: General Obligation Bonds offer the Conservancy another source of funds when required. The Conservancy can issue Bonds to finance habitat restoration projects. These General Obligation Bonds must be approved by California voters.

Financial Capability--Conclusion
At this time the local sponsor has a satisfactory financial position. The current federal and state policy emphasis on environmental restoration has resulted in increased funding and expanding budgets for restoration oriented agencies. This expansion of funding has been reflected in the conservancy's budgets over the last several years and is likely to continue. In addition, the Conservancy's access to alternative funding sources as indicated above is strong. In aggregate, the local sponsor appears to have the financial wherewithal to provide the funds for the non-federal project cost. These funds may or may not derive from debt instruments. The actual funding mechanism or combination of funding mechanisms to be used by the local sponsor will be determined before the PCA is signed.

5.9.4. Permits:

Prior to project construction, the Corps would demonstrate that the project complies with the Clean Water Act. Project requirements would be coordinated with the California Regional Water Quality Control Board for compliance with requirements of the Act.